

Laser Engraved Business Cards

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Overview

This paper will highlight the design process, issues, and solutions involved in the manufacturing of anodized aluminum business cards using ULS(universal laser systems) model PLS6.75.

Tools & Skills used

- CAD software - Onshape(initially)
- Adobe Illustrator
 - Customized various cards based on client requests
 - Select correct color mode and raster effects
- ULS software
 - Specify centering, material type, material thickness, fixture type, and power settings
 - Optimized raster engrave settings
- ULS model PLS6.75
 - Follow safety protocol
 - Configure correct Z-scale



Constraints and Intention for Use

The metal business cards feature standard contact information along with a QR code that links directly to the student's LinkedIn profile. Intended for university students like myself, the metal business card serves as a unique tool to stand out in competitive networking environments.

Project Timeline: Processes, Issues, and Solutions in chronological order

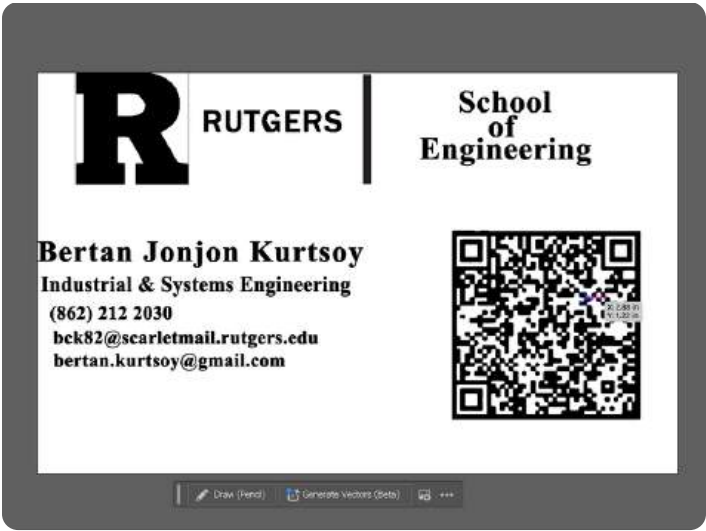
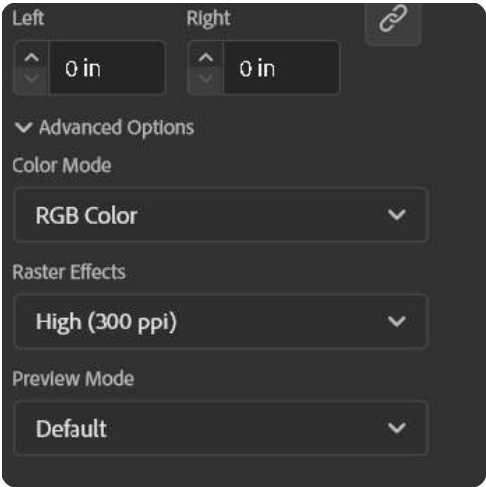
Issues with CAD design and 3D printing software



The project began with an initial prototype designed using Onshape CAD software for 3D printing with PLA plastic. However, the QR code's individual cells were too small for the printing software to recognize valid vector values.

I opted to laser engrave the designs onto anodized aluminum 3.4x2.2x0.03 [in] sheets. Given this, I was tasked with learning ULS software, Adobe Illustrator for raster engraving, and complete the safety training and certification for laser engraving machines at the Rutgers Makerspace.

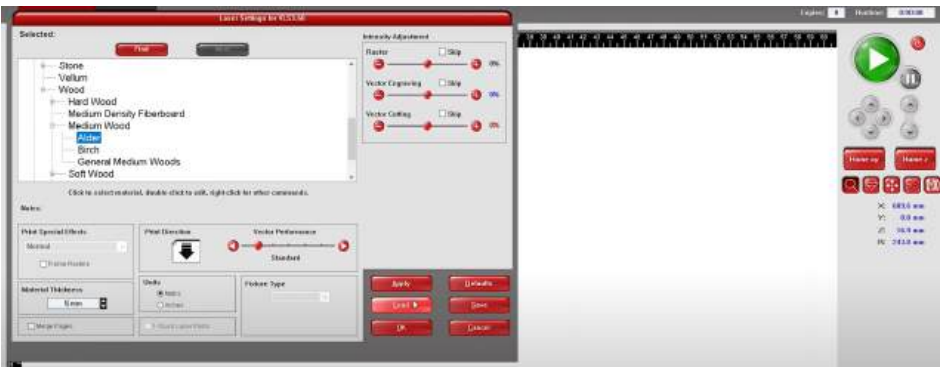
Design on Adobe Illustrator



As seen above, I replicated the original CAD design in Adobe Illustrator with Color Mode as RGB and Raster Effects at 300 PPI. Without these presets selected, the ULS software runs into rendering issues along edges of letters and small curves.

To turn images and text into vectors, I hit expand->object+fill->ok. To export the design to ULS, I selected file->print->setup, which brought me to the tab below.

ULS software settings and ULS Model PLS6.75



As seen left, Once the design was imported to the ULS software, I specified the material type as anodized aluminum, the material thickness as 0.03", the fixture type as none, and kept the default power settings.

As seen right, the ULS model PLS6.75 uses a 10.6μm CO₂ laser (10 to 75 watts) and/or 9.3μm CO₂ laser (30, 50, or 75 watts). To ensure laser precision, I configured the Z-scale on the machine interface(shown with red arrow). I then started the print, where I learned that looking at the laser too long hurts the eyes.

First Print and takeaways



Assessing the first print, everything ran smoothly except for the QR code which appears to be burnt along the right side. Initially, I thought that raster power needed to be decreased, however, after considering that anodized aluminum reveals a white surface when exposed to high heat, the burnt appearance is actually due to a lack of raster power.

After a few more prints, I found that +18% raster engrave was the most optimal setting for the dimensions of my card.

Final Results and Conclusions



While the progression of the project seems logical in hindsight, navigating the process step-by-step was a real challenge. Individually, none of the technical components—ULS software, Adobe Illustrator, or the certification process—were particularly difficult. However, understanding how to integrate them effectively into a streamlined workflow proved to be an operational challenge. Starting out, the sheer number of possible approaches was overwhelming, making it difficult to determine the best course of action. Additionally, I had to balance efficiency with execution, ensuring that time wasn't wasted on unnecessary steps.

Through this experience, I learned an important lesson about project execution: while optimization is valuable, it's often better to start with a plan that's 70% complete rather than wait for a fully optimized plan. Early execution provides insight that isn't always apparent in the planning phase, and excessive pre-planning can sometimes be counterproductive—especially if initial assumptions turn out to be incorrect. Ultimately, this project reinforced the idea that sometimes, the best way forward is simply to start with a solid direction rather than a fully mapped-out process.

If you're interested in a card, contact me, I won't charge you but I work on a I-Owe-You system